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ABSTRACT

A study of the processing of morphophonology by native speakers and second language learners focused on the processing of the Japanese potential suffix. The subjects were 13 Japanese adults (mean age 27.1) and 13 advanced learners of Japanese as a second language (mean age 26.6). The production of the potential inflection by the two subject groups was compared under time pressure. The task stimuli were from the two morphophonological classes of Japanese verbs: vowel-stem verbs (verbs whose stems end with vowels) and consonant-stem verbs (whose stems end with consonants). The results indicated that native speakers were always more proficient than nonnative subjects, but for both groups, consonant-stem verbs were always more difficult than vowel-stem verbs. No interaction was found between the two variables, native-nonnative proficiency and verb classification. When the stimuli were further reclassified to reflect item difficulty, the distribution of errors was again found to be independent of whether the speaker was native or nonnative. It is concluded that within the area of morphophonological processing, nonnative speakers of Japanese closely resemble native speakers. (MSE)

THE PRODUCTION OF JAPANESE VERB INFLECTION: PROCESSING IN NATIVE SPEAKERS AND SECOND LANGUAGE LEARNERS

by

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Abstract

How is morphophonology processed by native speakers of a language and second language (L2) learners? In the present study, the processing of the Japanese potential suffix was investigated. The subjects were 13 Japanese adults (mean age = 27.1) and 13 advanced L2 learners of Japanese (mean age = 26.6). The production of the potential inflection by the two subject groups was compared under time pressure. The task stimuli were from the two morphophonological classes of Japanese verbs: Vowel(V)-Stem verbs (verbs whose stems end with vowels) and Consonant(C)-Stem verbs (verbs whose stems end with consonants). The results indicate that native subjects were always more proficient than non-native subjects, but for both native speakers and L2 learners, C-Stem verbs are always more difficult than V-Stem verbs. No interaction was found between the two variables: native/non-native proficiency and V-Stem/C-Stem classification. The stimuli were further reclassified to reflect item difficulty. Even after reclassification, the distribution of errors was again found to be independent of whether the subject was a native or non-native speakers. Within the area of morphophonological processing, non-native speakers closely resemble Japanese native speakers.

Introduction

When a non-native speaker makes a speech production error (or 'mistake'), it stands out. When a native speaker makes a speech error, it is ignored. Nevertheless the two speakers may be making the same morphophonological mistakes. The present study has grown out of this rather 'radical' presupposition.

A distinction has been made between mistakes and errors due to incomplete knowledge (Corder 1967). Emphasis has been put on errors because they are supposed to show the learning processes. At the same time, speech production mistakes have been used as evidence for the representation of rules in the speaker (Fromkin 1973; Garrett 1975). We hold the position that the learning process, whether for L1 or L2, results in representation which must be employed in performance, and that it is performance which people see as language mastery. Thus, we base our investigation and discussion on performance errors made by native and non-native speakers. [Henceforth, the term 'error' refers to what Corder (1967) calls a 'mistake'.]

A good number of morpheme studies have been done in the fields of first and second language acquisition. One of the most frequently asked questions in SLA is 'whether first and second language learning processes are, in fact, the same' (Hatch 1983:44). One way to investigate this question has been to look at the acquisition order of inflectional morphemes (e.g. Bailey, Madden, & Krashen 1974; Dulay &

Burt 1974; Hakuta 1974). Little experimental research to date, however, has investigated the psycholinguistic processing of inflectional morphemes. The present study therefore asks the following question: How is morphophonology processed (not acquired) by native speakers of a language and L2 learners?

Another concern of ours is that no experimental work has been done on the comparison between Japanese native and non-native speakers. Most morphophonological studies have been done in English (e.g. Berko 1958; Natalicio & Natalicio 1971), or in English-like languages (Kernan & Blount 1966 [in Spanish]; Swain, Naiman, & Dumas 1971 [in French]), either as a first or second language. English can be characterized by what we call 'addition processes' (i.e. processes in which morphemes can be added to stems, where stems are words): e.g., walked consists of walk and -ed, where walk exists as a word. Japanese, on the other hand, entails both subtraction and addition processes (i.e. processes in which stems must be identified by subtracting affixes and then proper morphemes are added). For instance, Japanese verb stems are never words, and verbs never exist without suffixes: aruita 'walked' consists of arui- and -ta, while arui- does not exists as a word. Thus, the production of Japanese verb inflection entails highly ambiguous cues.

In the present study the production of the Japanese potential suffix was investigated since it involves a

complex morphophonological processes. It is useful to look at Jorden's description of the potential form, which means 'can do so-and-so'. To make the potential form of:

-ru verbs: Substitute -rare-ru for final -ru

(e.g. akeru 'open' > akerareru 'can open')

-u verbs: Substitute -e-ru for final -u

(e.g. kaku 'write' > kakeru 'can write')

(see Jorden 1963:97-98)

The Japanese potential inflection follows regular rules (with only three exceptions). The stems of -ru verbs end with vowels (V-Stem verbs), while those of -u verbs end with consonants (C-Stem verbs).

What is complex about the application of these rules is that the stem must be identified so that the proper allomorph of the potential, -rareru or -eru, can be suffixed. The identification of the stem is difficult because Japanese verbs never appear without a suffix. In addition, the identification of some verb stems is highly ambiguous. For instance, the verbs kiru 'wear' (V-Stem verb) and kiru 'cut' (C-Stem verb) are segmentally identical in the non-past form (but distinguished by suprasegmental features). In the past form, they change to kita 'wore' and kitta 'cut [past]'. In order to decide whether a verb belongs to either the V-Stem or C-Stem category, the speaker must compare more than one inflectional form. Beyond that, the allomorphs of the potential suffix themselves may be ambiguous. The allomorph for V-Stem verbs -rareru is

identical to the passive suffix for V-Stem verbs: e.g. taberu 'eat' > taberareru 'can eat' or 'be eaten'. The allomorph for C-Stem verbs -eru is identical to a derivational suffix which often appears as part of transitive verbs: e.g. tatsu 'stand' > tateru 'can stand' = tateru 'build' or 'make stand'. The potential forms of some C-Stem verbs accidentally resemble other V-Stem verbs: e.g. kaku 'write' > kakeru 'can write' = kakeru 'pour'.

To summarize, the production of the potential form involves the following processes: 1) identification of the stem (i.e., Is it a V-Stem or C-Stem verb?), 2) selection of the correct allomorph (i.e., Is it -rareru or -eru?), and 3) combination of stem and suffix. Given its complex nature, how do native speakers and non-native speakers process the potential inflection? Is there a distinctive difference between Japanese speakers and L2 learners in the production of the potential form?

We hypothesize that when comparing the performance of native Japanese speakers with L2 learners, the native speakers will naturally be more proficient. This should translate into a lower error rate on a given task. However, we also hypothesize that processing will be essentially the same for both groups because of the following assumption: the processes speakers use is largely determined by the structure of the language being learned. Our claim is made stronger if we can show that adult L2 learners resemble native speakers in reacting to the difficulty of the task

and making similar types of error.

As described above, difficulty is intrinsic in the production of the Japanese potential form. In our experiment we set up the time constraint in order to reinforce this difficulty. We expect that this increased difficulty will have the same effects on both native and non-native subjects. In other words, in examining the types of error made by the two groups, we hypothesize that there will be no significant interaction between the two variables Native / Non-Native Proficiency and the Type of Error.

The absence of interaction will give us reasonable support for considering error in this experiment as being basically the same phenomenon across L1 and L2 subject groups. By combining the errors made by these two groups, we will increase our chances at understanding which stimuli caused the most confusion, and what the most likely result of that confusion was.

Method

Subjects: The experiment was administered to 26 subjects, 13 native Japanese speakers (Mean age: 27.1) and 13 non-native speakers (Mean age: 26.6). The ratio of male to female subjects (M : F) was 8 : 5 in both groups.

The native speakers all came from areas east of Nagoya and most were from the Tokyo area. These dialect areas conform to the conditions of allomorphs for the potential suffix outlined above (cf. Martin 1975:301).

The non-native speakers were students of Columbia University, who were enrolled in the 3rd, 4th or 5th year of Japanese, or who had equivalent Japanese skills. Many (11 out of 13) had spent six months or more (Average length: 1.3 years) living in Japan. Eleven of the non-native subjects were American-born, and two were born in China.

Materials: The stimuli were comprised of 20 sentences in Japanese, recorded by a native speaker onto audio cassette. The stimuli sentences had a standard length of 5-7 syllables. All sentences were Noun - Post Position - Verb sequences: e.g. <u>mizu</u> 'water' - <u>o</u> - <u>nomu</u> 'drink' (drink water). The noun (mostly the direct object of the verb) was given in order to clarify the meaning of the verb. The verb was always in the non-past form (i.e. suffixed with -<u>ru</u> or -<u>u</u>). All the verbs used for the experiment were selected from the 1,000 most basic and frequently used words, which are acquired by 6-year-old Japanese children (Sakamoto 1958). (See Appendix A.)

When recording, the native speaker read the stimuli sentences at a pace regulated by a metronome set to one beat per second. The speaker read the Noun - Post Position sequence on the first beat and the verb on the second beat. A new sentence was begun on every fourth beat. Each stimulus sentence lasted about 1.5 seconds, leaving the subjects 1.5 seconds for response before the beginning of the next item. The order in which the 20 sentences were read was completely randomized for every presentation.

Eighteen of the stimuli verbs consisted of nine pairs of V-Stem verbs and C-Stem verbs that closely resembled one another phonologically. Occasionally the match was perfect (e.g. kiru 'wear' -- a V-Stem verb and kiru 'cut' -- a C-Stem verb), but more often the match differed by one syllable (e.g. oru 'fold' -- a C-Stem verb and oriru 'get off' -- a V-Stem verb), The two remaining verbs were consonant stem verbs whose stem final segments ended in /r/. These two stimuli verbs were included because pilot research had suggested that the /r/ was a particularly confusing stem final cue. A complete list of the stimuli sentences is presented in Appendix A.

Procedures: The subjects were interviewed before given the experimental task (see Appendices B and C). Non-native speakers were first asked to translate the 20 stimuli sentences, in order to insure familiarity with the stimuli. Then, both native and non-native speakers were given a trial run at the experiment. They were instructed to listen to the sentence and to respond with only the non-past potential form of the verb.

In the colloquial Japanese the allomorph -reru is sometimes used instead of -rareru for V-Stem verbs: e.g. tabe-reru instead of tabe-rareru 'can eat'. Native speakers were, however, requested to use only two allomorphs, -eru and -rareru for their responses, and to avoid using -reru if possible.

All subjects understood the task. At the end of the

practice run subjects were told that the experiment would entail the same stimuli as in the trial run, but presented in a new order. The experiment was then administered. The stimuli were presented on a Wollensak --- monoaural tape recorder. The subjects wore a small lavelier microphone. A stereo tape was made during the run of the experiment with the stimuli on one track and the subjects' responses on a separate track.

Results

We will review the results of the experiment in three steps. In the first step, we will consider the question of whether C-Stem verbs are more difficult to process than V-Stem verbs, and whether native Japanese speakers differ from non-native speakers with respect to their processing of these two verb stem classes. In the second step we will break down the experimental stimuli into a finer classification that better captures their processing difficulty. In the third step, we will compare native Japanese speakers and non-native speakers with respect to the reclassification of the stimuli.

There were nine sets of opposing C-Stem / V-Stem verb pairs among the stimuli. An analysis of variance of correct responses was performed to test whether the effect of the gross morphological distinction between C-Stem and V-Stem verbs was the same for both Japanese and non-native speakers. Both main effects were found to be significant at

the alpha = .01 level: morphological type, F [1,48] = 8.11, and subject group, F [1,48] = 9.79. The interaction of the two factors was not found to be significant. The means and standard deviations of the number of correct stems is reported in Table 1.

Insert Table 1 about here

Japanese subjects were always more proficient than non-native speakers, and V-Stem verbs were always easier to process than C-Stem verbs. While this result is consistent with our hypothesis that native Japanese speakers and non-native speakers are processing morphological information in much the same way, we also recognize that the C-Stem / V-Stem distinction is only a gross morphological distinction. In addition, it is clear that our task was insensitive to differences between Japanese subjects in the V-Stem verb condition. Only one Japanese subject made an error on a V-Stem verb. For these reasons we felt the need to reclassify the stimuli.

Our first move in performing this post-hoc analysis was to look for a particular stem final segment which might have been particularly confusing. Stem final /r/ (R-Stem) seemed to be particularly problematic. There is an important reason why this should be so. All the stimuli were presented with the -<u>(r)u</u> 'non-past' suffix. We reason that if subjects must subtract the suffix to arrive at a stem,

stem final /r/ might be misanalyzed as part of the suffix instead of the stem. Recall that two R-Stem verbs, suwaru 'sit' and wataru 'cross' were not paired with V-Stem verbs. The R-Stem class is further detailed in Table 2.

Insert Table 2 about here

We also detected another class of error prone stimuli. Four V-Stem verbs have the vowel /e/ as their stem final segment (E-Stem). In their non-past form they are homophonous with the potential forms of C-Stem verbs also included in the stimuli: e.g. kakeru 'pour' = kak-eru 'can write'. It appeared that the four pairs of /e/ final V-Stem verbs and their associated C-Stem verbs constituted another problematic class. We will refer to this class as E-Stem Pairs, and they are detailed in Table 2. This accounts for 13 of the stimuli verbs. The remaining seven stimuli form a default class of items that do not fall into either the R-Stem class or the E-Stem Pair class.

The objective of the reclassification was to formulate classes that better predicted the distribution of error responses. A multiple regression was performed on this classification to test its ability to account for the distribution of both Japanese and non-native speaker errors combined. The resulting regression equation itself is not the focus here, but rather 1) the amount of variability in error distribution the equation accounts for, and 2) whether

the two morphological classes, R-Stem and E-Stem Pairs, both contributed significantly to the regression equation.

By including both the R-Stem class and the E-Stem Pair class in the equation, we accounted for a healty 47% of the variability in the distribution of errors (Multiple R = .69). The F test of the two variable equation gave a significant result, F [2,19] = 7.54 p < .004. However, the E-Stem Pair class did not contribute significantly to the regression equation. By dropping the E-Stem Pair class from the regression equation, the amount of variability in the distribution of errors for which we could account reduces slightly to 4?% (Multiple R = .67). However, when only the R-Stem class is used, the significance of the F test upon the equation increases dramatically, F [1,18] = 14.4 p = .001. On this basis we feel confident in positing the R-Stem class as a class of stimuli that causes a particularly high amount of confusion. We cannot feel the same confidence about the E-Stem Pair class. Our reclassification of the stimuli is the following: R-Stem verbs / Non-R-Stem verbs.

The final question in our evaluation of the results was whether Japanese speakers' errors and non-native speakers' errors were associated in any demonstrable way with the new reclassification of the stimuli. We plotted the 49 errors onto a 2 X 2 contingency table (Table 3), classifying each of the 49 errors as being a response to an R-Stem verb or a Non-R-Stem verb, and committed by a Japanese subject or a

non-native subject.

Insert Table 3 about here

As one can see from Table 3, 67% of the Japanese subjects' errors were responses to R-Stem verbs, but 54% of the non-native subjects' errors were responses to R-Stem verbs. Despite this difference, Chi Sq test of independence of the stimuli group distinction from the subject group factor returned a non-significant result, Chi Sq = .18 p > .5. The distribution of error responses to morphological class was independent of whether the subject committing the error was Japanese or a non-native speaker. In short, non-native speakers closely resemble Japanese speakers.

Discussion

Within the area of morphophonological processing L2 learners gradually approach native speakers, who themselves are prone to certain errors. The most difficult feature of the stimuli verbs to process was the stem final /r/. We can readily interpret why this is so. The segment /r/ is part of the allomorph -ru for the non-past suffix, and at the same time, the stem final segment of R-Stem verbs. Due to the ambiguity of this stimulus feature, both native and non-native speakers produced similar mistakes. For example, given the R-Stem verbs kiru 'cut' and atsumaru 'gather',

both groups produced the deviant forms *kirareru and *atsumerareru. Within the area of R-Stem verbs, non-native speakers' errors resemble native speakers' not only quantitatively but also qualitatively.

As we focus on Non-R-Stem verbs, we find that some of non-native speakers' errors are quite different from native speakers'. For example, non-native subjects gave the deviant forms *tsukuwareru or *tsukurareru instead of tsukeru (for tsuku 'tell [a lie]') and *tatarerareru instead of taterareru (for tateru 'build'). The deviation of such errors is mostly due to the incorrect suffixation of the wrong allomorph. Such errors are, however, few compared with the type of error both groups are prone to. Thus we find a narrowing range of variation toward a baseline of native speakers' error.

A model has been suggested by Beebe (1984) to explain the range of variation in interlanguage phonology. In Beebe's study it is suggested that in the earlier phases of L2 learning learners exhibit mostly native language (NL) variants, i.e. phonological transfer. In the next phase learners may add to their L2 repertoire and a large number of approximations may occur as they advance to the intermediate level' (Beebe 1984: 57-58). In the advanced phase the range of variation decreases until they resemble native speakers. In our study, non-native speakers seem to be in the high-intermediate phase, exhibiting a moderately wide range of variation around the most common problem, the

R-Stem. The one major difference between Beebe's model and the phenomenon we observed is that in morphophonology there is no opportunity for transfer from L1, so that there are no NL variants in production.

In theory then, there is no limit to the non-native speaker's progress toward the native norm. However, we must note that the task used in this experiment is quite artificial. Morphophonology was isolated from other factors that usually influence natural speech production. In natural speech L2 learners may exhibit a wider range of morphophonological errors due to performance factors. At the same time they may make other types of error: phonological, semantic and pragmatic errors. Therefore, the learner may not seem proficient over all. If we focus on and isolate morphophonology, we find errors that look much like native-speaker slips of the tongue.

It may be revealing to consider the formulation of the potential suffix taught in the classrooms of the non-native speaker subjects. For instance in Jorden (1963) this rule is formulated in terms of the allomorphs -ru and -u, not in terms of the vowel-/consonant-stem distinction. It may be that the teaching method misses the most 'economical' way of explaining the suffixation process. On the other hand, the established explanation seems to be based on 'hiragana', the CV syllabary of Japanese orthography. In fact, the majority of our non-native subjects had the 'explicit knowledge' of how to make the potential form and explained it in terms of

the distinction between -ru verbs and -u verbs. It may be that this traditional way of explaining the suffixation is the source of error. The evidence for this comes from the fact that the R-Stem class caused the most confusion. Non-native subjects were trying to locate the -ru suffix as motivated by their classroom explanation.

The suffixation process can be much more easily understood, especially by English-speaking learners, if the distinction is made between V-Stem and C-Stem verbs: e.g. atsumaru 'gather' is a C-Stem verb (rather than an -u verb) since it consists of the stem astsumar- and the non-past suffix -u. It is, however, difficult for the Japanese native speaker to grasp this most efficient explanation because in Japanese a consonant alone never exists. If the teaching method is improved and the explanation of the suffixation process is formulated according to the L2 learner's native intuition, it might become possible for them to overcome the problem of R-Stem verbs. However, this must be a topic for future research.

In conclusion, there is a good deal of hope for L2 learners. However, the L2 learner cannot expect to be perfect because even L1 learners make mistakes. The moral is that when it comes to the mechanics of morphology and syntax, to err is human.

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Table 1

Items Correct: L1/L2 x V-Stem/C-Stem

		Subject Group	
Verb-Stem		Native	Non-native
V-Stem	Mean	8.9	8.2
	SD	.1	1.3
C-Stem	Mean	8.2	7.3
	SD	1.0	1.0

Table 2

Frequency of Errors:

R-Stem, E-Stem Pair, & Default Class

	Errors by Native Ss	Errors by Non-native Ss	Total Errors
R-Stem Class			
kiru 'cut'	3	8	11
oru 'fold'	2	5	7
atsumaru 'gather'	2	4	6
suwaru 'sit'	1	1	2
wataru 'cross'	0	2	2
Total:	8	20	28
Mean n of errors:			5.6
E-Stem Pair Class			
tsuku 'tell (a lie)'	1	3	4
tsukeru 'put on'	0	0	0
tatsu 'stand'	1	0	1
tateru 'build'	0	3	3
kaku 'write'	1	1	2
kakeru 'pour'	0	1	1
tsumu 'pick'	0	1	1
tsumeru 'stuff'	1	2	3
Total:	4	11	15
Mean n of errors:			1.9

(Table 2 continued)

(Table 2 continued)

Default Class			
oriru 'get off'	0	3	3
atsumeru 'collect'	0	2	2
nomu 'drink'	0	1	1
nameru 'lick'	0	0	0
tobu 'fly'	0	0	0
tabéru 'eat'	0	0	0
kiru 'wear'	0	0	0
Total:	0	6.	6
Mean n of errors:			.9

Table 3

Homogeneity of Errors Across Subject Groups

Stimuli Class	Native	Non-native	Total
	Subject Group		
R-Stem	8 (6.9)	20 (15.4)	28
Non-R	4 (5.1)	17 (11.6)	21
Total	12	37	49

( ) = expected frequencies

Appendix A

A List of 20 Stimuli Sentence

Sentence	Translation	Verb	Class
Eki-ni Atsumaru	'gather at the station'	Atsumar-u	C
Kane-o Atsumeru	'collect money'	Atsume-ru	V
Moji-o Kaku	'write characters'	Kak-u	C
Mizu-o Kakeru	'pour water'	Kake-ru	V
Shatsu-o Kiru	'wear a shirt'	Kir-u	C
Niku-o Kiru	'cut meat'	Ki-ru	V
Mizu-o Nomu	'drink water'	Nom-u	C
Ame-o Nameru	'lick candy'	Name-ru	V
Kami-o Oru	'fold paper'	Or-u	C
Basu-o Oriru	'get off a bus'	Ori-ru	V
Hitori-de Tatsu	'stand up by oneself'	Tat(s)-u	C
Ie-o Tateru	'build a house'	Tate-ru	V
Sora-o Tobu	'fly in the sky'	Tob-u	C
Mochi-o Taberu	'eat rice-cake'	Tabe-ru	V
Uso-o Tsuku	'tell a lie'	Tsuk-u	C
Nori-o Tsukeru	'put on some glue'	Tsuke-ru	V
Hana-o Tsumu	'pick flowers'	Tsum-u	C
Hako-o Tsumeru	'stuff a box'	Tsume-ru	V
Isu-ni Suwaru	'sit on a chair'	Suwar-u	C
Hashi-o Wataru	'cross a bridge'	Watar-u	C

Appendix B

Interview Questions to Native Subjects

Name:

Age:

Where were you born? (What city?)

What dialect do you speak?

Years spent in the U.S.?

If you are a student, what is your major?

If you work, what kind of work do you do?

Have you ever taught, or tutored in, Japanese?

If yes, which level? Where? How long?

Do you speak any foreign languages other than English?

What do you think is most difficult about spoken Japanese?

For native speakers? For non-native speakers?

Can you explain to me the rule for the formation of the potential form of Japanese verbs; for instance, "mitsukeru" becomes "mitsukerareru" and "hanasu" becomes "hanaseru"?

You are going to hear 20 short sentences.

1) Please give the potential form of each verb without its object.

2) Please do not omit "ra" in the case of "rareru".

Let's practice. <Practice Run>

Let's start. <Experiment>

Appendix C

Interview Questions to Non-Native Subjects

Name:

Age:

Where were you born?

Age started studying Japanese:

What was the motivation?

Practice in Japanese outside of class:

TV? Friends? Family?

Do you speak any other foreign languages?

What do you think is most difficult about spoken Japanese?

Can you explain to me the rule for the formation of the potential form of Japanese verbs; for instance, "mitsukeru" becomes "mitsukerareru" and "hanasu" becomes "hanaseru"?

Can you translate the following 20 sentences?

<List of 20 sentences read>

You are going to hear the same 20 sentences. Please give the potential form of each verb without its object.

Let's practice. <Practice Run>

Let's start. <Experiment>